

Osteolysis in Hand and Wrist Surgery: Are PEEK Implants at Higher Risk?

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Background: Polyetheretherketone (PEEK) suture anchors are increasingly used in orthopedic surgery because of their radiolucency, biocompatibility, and mechanical strength for soft tissue fixation. However, osteolysis has been reported as a potential complication. This study aimed to evaluate the incidence of osteolysis in patients receiving PEEK anchors compared to non-PEEK implants in hand and wrist surgery.

Methods: We performed a retrospective review of patients who underwent wrist or hand surgery with PEEK anchors versus non-PEEK implants between January 2020 and April 2025. Patients were controlled for age, gender, and race. Perioperative fluoroscopy was used to record initial tunnel size, and the most recent postoperative imaging was reviewed to assess changes in tunnel dimensions. Osteolysis was defined as either a radiographic report explicitly noting osteolysis or a >30% increase in tunnel size compared with baseline.

Results: A total of 342 patients were included, with 51 in the PEEK group and 291 in the non-PEEK group. Demographics were largely similar between cohorts with respect to age, BMI, sex, hypertension, diabetes, and smoking status (all $p > 0.05$). However, significant differences were observed in race distribution ($p < 0.001$) and chronic steroid use (6.1% vs. 0.7%, $p = 0.02$). Operative time was significantly longer in the PEEK group (118.1 ± 45.7 min vs. 100.7 ± 55.2 min, $p < 0.001$). Rates of osteolysis were higher in the PEEK group (3.2% vs. 0.4%), although this difference was not significant on unadjusted analysis ($p = 0.22$). Multivariable analysis controlling for age, gender, and race demonstrated that PEEK implants were independently associated with increased odds of osteolysis (OR 38.8, 95% CI 1.59–948.7, $p = 0.025$). Revision rates were similar between groups (3.6% vs. 3.0%, $p = 0.60$), with no significant difference on adjusted analysis (OR 1.61, 95% CI 0.17–15.37, $p = 0.68$).

Discussion: In this matched cohort, PEEK implants were associated with significantly longer operative times and a higher risk of osteolysis compared to non-PEEK implants, while revision rates did not differ between groups. These findings suggest that although PEEK remains a viable option, its potential association with osteolysis warrants caution and further investigation.

Clinical Relevance: Implant selection in forearm fixation impacts both operative efficiency and long-term outcomes. While PEEK implants provide theoretical advantages, this study highlights an increased risk of osteolysis without a reduction in revision rates. Surgeons should carefully consider implant choice, particularly in patients at risk for bone–implant interface complications, and further research is needed to define the optimal role of PEEK in clinical practice.

Table 1. Baseline characteristics of patients undergoing surgery with PEEK vs non-PEEK anchors

Variable	PEEK (N = 51)	Non-PEEK (N = 291)	P-value
Age, mean ± SD	46.35 ± 9.78	46.60 ± 15.14	0.72
BMI, mean ± SD	33.72 ± 8.73	30.39 ± 7.27	0.07
Female, n (%)	24 (49.0%)	150 (51.5%)	0.76
Race, n (%)			<0.001
– Caucasian	8 (16.3%)	147 (50.7%)	
– African American	32 (65.3%)	104 (35.9%)	
– Asian	1 (2.0%)	4 (1.4%)	
– Other	8 (16.3%)	35 (12.1%)	
HTN, n (%)	21 (42.9%)	98 (33.8%)	0.26
DM, n (%)	9 (18.4%)	37 (12.7%)	0.37
Hypothyroidism, n (%)	0	10 (3.4%)	0.37
Smoking Status, n (%)	7 (14.6%)	41 (14.1%)	1.0
Alcohol User, n (%)	16 (33.3%)	66 (22.7%)	0.14
Rheumatoid Arthritis, n (%)	2 (4.1%)	13 (4.5%)	1.0
Osteoporosis, n (%)	0	1 (0.3%)	1.0
Chronic Steroid, n (%)	3 (6.1%)	2 (0.7%)	0.02
ASA Class, n (%)			0.053
– I	8 (16.7%)	46 (17.8%)	
– II	18 (37.5%)	142 (54.8%)	
– III	22 (45.8%)	70 (27.0%)	
– IV	0	1 (0.4%)	
Operative Time, mean ± SD (min)	118.06 ± 45.69	100.67 ± 55.21	<0.001

Table 2. Outcomes in patients with PEEK vs non-PEEK anchors

Variable	PEEK (N = 51)	Non-PEEK (N = 291)	P-value
Osteolysis, n (%)	1/31 (3.2%)	1/233 (0.4%)	0.22
Revision, n (%)	1/28 (3.6%)	7/235 (3.0%)	0.60

Table 3. Multivariate Adjusted analysis (controlled for age, gender, and race):

	OR Osteolysis (95% CI)	P-value	OR Revision (95% CI)	P-value
PEEK vs Non-PEEK	38.80 (1.59–948.65)	0.025	1.61 (0.17–15.37)	0.68

